REMARKS

This Amendment is in response to the Office Action dated May 12, 1999 in which the examiner made certain formal objections to the specification, claims and drawings. The objections are believed to have been overcome by the amendments herein.

The Examiner also rejected claims 10-12, 14-15, 17-37 and 42-54 as allegedly anticipated by Jeanneret. The Examiner indicated that claims 1-9, 13, 16 and 38-41 are allowable.

The Examiner's rejection of the claims is respectfully traversed for the reasons set forth below.

The invention is directed to an electromagnetic device which employs a high voltage cable structure as a winding therein. In the cable, an insulating cover comprising a solid insulation layer flanked by inner and outer semiconducting layers operated to confine the electric field with the cable and thereby reduce electric stress in the insulation. Thus, the invention permits high voltage operation not previously available.

The invention also employs a conductor core which is formed of a plurality of insulated conductive strands and at least one uninsulated conductive strand in contact with the insulating cover. This arrangement does two things. First, the insulated strands carry high voltage and at the same time, reduce or minimize eddy current flow between strands. This is advantageous as it reduces electrical losses and minimizes eddy current generated losses, which at the power lever contemplated, would be prohibiting expansion and would cause the cable to over heat.

In addition, the uninsulated strands in contact with the covering help to establish an equipotential surface around the conductive core to thereby reduce electric field stress as hereinafter discussed. Further, the art of record and references cited by applicants do not achieve these results nor does the art suggest the possibility of these advantages.

Jeanneret shows a device for controlling asynchronous motor. However, Jeanneret does not disclose or suggest that it would be useful to employ a winding employing an insulation system as set forth in the present invention. New claim 55, which has been substituted for canceled claim 10 recites a winding employing at least one current carrying conductor including insulated and insulated strands and an electric field confining solid insulation covering surrounding the conductor in contact with the uninsulated strands. Independent claim 19 describes an insulation system with electrical and thermal properties permitting a voltage level exceeding 36kV. Independent claim 20 sets forth a

winding having an insulation system comprising two semiconducting layers forming an equipotential surface. Claim 29 sets forth a cable having a conductor with a number of strands, an inner and outer semiconducting layers and a solid insulation therebetween.

Claim 42 sets forth a rotating asynchronous converter having a winding with a magnetically permeable, electric field confining cover surrounding the conductor formed of insulated and uninsulated conductors.

The winding described in the present invention allows for operation of high voltages. Generally speaking, high voltages are considered to above about 36kV which is generally recognized as the upper limit of operation of conventional large machines. None of the references cited by the Examiner or referred to herein either alone or in combination achieve such a result.

The Examiner has rejected claims 14, and 15 which depend from allowed claim 13. The Examiner has also rejected claim 17 and 18 which depend from allowed claim 16. It is requested that the Examiner withdraw the rejection.

Applicants wish to direct the Examiner's attention to Nikitin et al., U.S. Patent No. 4,429,244 and Breitenbach et al., U.S. Patent No. 4,785,138 cited in related applications and Elton, U.S. Patent No. 5,036,165 cited by applicants in the Information Disclosure Statement filed with the application.

Nikitin shows a high voltage element in an insulating sleeve. Nikitin develops a high voltage generator based on a complex and expensive oil/paper insulation systems used for both the insulation and cooling as is done in conventional power transformers. This differs from the invention in many respects. One of the most important features of the present invention is that it uses solid insulation with semiconducting layers giving full control of the electric fields within the stator winding as it is positioned in the stator and the end region areas. Nikitin et al. shows an arrangement of a cable type termination around high voltage elements. See for example, column 3, lines 21-26. Outside the termination, in the end region, the electric field is no longer confined within the stator winding. The end winding region of Nikitin is filled with oil for insulation and cooling. The present invention does not use end winding termination or oil insulation. Another important difference is that Nikitin teaches a limited number of slots per pole in the stator winding. See for example column 2, line 68 and column 3, line 1 and Fig. 3. The present invention uses numerous slots per pole.

Breitenbach et al. discloses an electric cable for use as a phase winding in a linear motor. The cable includes a current carrying conductor, a conductive inner layer surrounding a conductor, an

insulation layer surrounding an inner layer, an outer conductive layer surrounding the insulating and a conductive sheathing surrounding the entire cable. The present invention is directed to a generating device in which at least one of the windings comprises a cable including a conductive member, an inner layer of semiconducting material, an insulation layer and an outer layer to control electric field stress. In addition, the present invention employs insulated and uninsulated strands in the conductive core to prevent high eddy currents which can damage a conventional cable under sustained operating conditions.

Breitenbach et al. is concerned with linear motors, wherein the stator can be very long and the winding is fixed in a meander like manner. Linear motors are used in intermittent service, for example, as a motor power unit in a train or for railway operations. In such applications, the stator is divided into sections, each section length being several hundred meters. The length of the stator is such that the inductance and consequently the reluctance of the winding is very high. Therefore, voltages of about 10KV are needed to get sufficiently high current in the winding for driving trains. Such a high current requires a conductor with considerable total conducting area. However, the voltage is still only in a low voltage region of up to about 1-10kV. Electric machines of the type described in the invention differ from a linear motor generally in that the former is run continuously using the same windings whereas a linear motor is run intermittently and has time to cool off. The insulated strands in the core element of the present invention prevent high eddy currents from overheating the cable. Breitenbach also suggests that the conductive outer layer allows a path for charge currents to surround as to prevent scorch spots where the cable phases come in contact. The present invention is designed to avoid high currents in the cable insulation. It is submitted that the cable in Breintenbach would not work in the high voltage applications of the present invention.

Elton describes a high voltage cable having an inner layer 144 of semiconducting pyrolized glass fiber material and/or an outer layer 110 of the same material whereby the outer layer is grounded. Once the teaching of Elton is fully considered and viewed as a whle, it will be apparent that Elton does not show or suggest the invention alone or in combination with any of the references. Even though is it is suggested in Elton to apply a semiconducting layer in the form of a pyrolyzed glass tape to a winding in a dynamo-electric machine and to apply such a layer in a power cable, there is no indication to use such a cable would be useful in Elton in a dynamo-electric machine. Indeed, the disclosure of Elton describes three different applications for a semiconducting layer. One

application is for using a pyrolized glass layer in a conventional high current , low voltage winding of a dynamo-electric machine. A second application is for a housing to reduce electric discharge in an enclosed circuit. Finally, Elton employs a semiconducting pyrolized glass layer in a conventional cable. However, there is no proposal to use the cable shown in Elton in a dynamo-electric machine. It is only the semiconducting tape that is used in an electric machine. The arrangement in Elton does not provide a solid insulating system as described and disclosed in the present invention. Nor does the cable have insulated and uninsulated strands in contact with the insulating covering. Thus, it cannot be considered obvious to one skilled in the art to use such a cable in a machine, because, at the time of the invention, it was not known to use such a cable with solid insulation as a winding in a machine and there is no teaching that would lead one skilled in the art to such a conclusion.

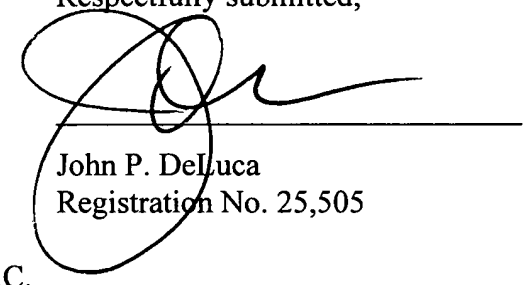
In summary, the references cited by the Examiner and references noted by the applicants arise in diverse arts, and one skilled in the art would not be inclined, for example, to employ a power cable in a machine (whether a rotatable motor/generator or static transformer/reactor), especially a cable which would have to be substantially modified to operate at high voltages and in high magnetic fields for sustained periods, reliably and without overheating.

The attached Information Disclosure Statement lists some patents which were earlier cited by the applicants along with newly cited references. The Information Disclosure Statement and the patents listed therein were filed in the office of Mr. Gelner on September 29, 1999. A petition has been filed so that the references may be handled as part of a bulk filing. A check in the amount of $240.00 is enclosed for filing the Information Disclosure Statement after the mailing of the first Office Action.

For the Examiner's convenience, a copy of each reference discussed herein is enclosed.

In view of the foregoing, it is respectfully requested that the Examiner reconsider his rejection of the claims, the allowance of which is earnestly solicited.

Respectfully submitted,



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